BY ORDER OF THE SECRETARY OF THE AIR FORCE	***AIR FORCE PAMPHLET 32-4019***
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	Civil Engineer
	CHEMICAL-BIOLOGICAL WARFARE COMMANDER'S GUIDE

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This pamphlet provides information to familiarize commanders with the Chemical and Biological (CB) defense program. The significant changes in Air Force missions, roles, and manpower have resulted in an information gap in the area of CB defense. In conjunction with providing updated CB defense information, this document can be used as a tool for evaluating CB defense program readiness. It focuses on the principles of CB defense and an insight to CB vulnerability analysis. The pamphlet supports AFI 32-4001, Disaster Preparedness Planning and Operations, and the USAF CB Defense Concept of Operations. Send comments and suggested improvements to HQ AFCESA/CEX, 139 Barnes Drive, Suite 1, Tyndall AFB FL 32403-5319

"I believe the proliferation of weapons of mass destruction presents the greatest threat that the world has ever known. We are finding more and more countries who are acquiring technology--not only missile technology--and are developing chemical weapons and biological weapons capabilities to be used in theater and also on a long-range basis. So I think that is perhaps the greatest threat that any of us will face in the coming years."

From Secretary of Defense Cohen's confirmation hearing - January 1997

Chapter 1

THE USAF CB DEFENSE PROGRAM

1.1. Introduction. Significant changes since the Gulf War in USAF missions, roles, and manpower have resulted in an information gap in the area of CB defense. The purpose of this guide is to familiarize squadron, group and wing commanders with the USAF CB defense program and to present the most current information available to provide the foundation for deliberate planning, establishment, execution, and evaluation of a base-level CB defense program. Joint Pub 3-11, Joint Doctrine for Nuclear, Biological, and Chemical (NBC) Defense, AFMAN 32-4005, Personnel Protection and Attack Actions, and the USAF Chemical and Biological Defense Concept of Operation are used to provide the framework for this guide.

1.1.1. A viable CB defense program is not a separate series of events exercised as an adjunct function to successful air operations. CB defense is a completely integrated program developed into contingency planning that, when successfully executed, provides the ability to sustain USAF operations in a CB environment.

1.1.2. Air power in the form of aircraft and aircrews are not dispatched into CB threat areas without the requisite fuel, ordnance, and maintenance support. Likewise, air power should not be introduced into CB threat areas without an integrated CB defense program. Without an effective CB defense program, warfighters would have little option but to vacate CB-targeted areas. Therefore, CB defense enhances the endurance of air power force projection and directly supports mission sustainment and resolution of the conflict.

1.1.3. The first step in the establishment of a base-level CB defense program is to have a clear understanding of the threat. This is not accomplished by fictionalizing the threat, but by carefully evaluating the ability of the enemy to acquire, develop, and deliver CB Weapons of Mass Destruction (WMD).

1.2. Threat. Possession of chemical and biological agent technologies, or more simply stated, knowing how to build a CB weapon, is only the first of four recognized steps in posing a military CB threat. The second step is the ability to produce sufficient quantities of an agent to pose a threat to the installation. It should be noted that even at the lowest level, laboratory scale, production capacity can be sufficient to generate strategic quantities for military application. The third step in becoming a CB threat is to be able to effectively weaponize the agent for delivery against an enemy. Even crude delivery vehicles have proven to be somewhat effective. Some of the more common methods of delivering chemical agents are aerial bombs, artillery rockets, artillery shells, mortar rounds, grenades, mines, and missile warheads. Certain biological agents are most effective when delivered as sprays or fogs. Finally, the fourth, and final, step is making it known that you are actually willing to employ such weapons. Recently the threat of covert application has grown, as evidenced by the Tokyo subway incident. Covert operations also increased the potential threat for biological contamination of food and water supplies. **Table 1.1.** provides a selected list of chemical and biological warfare agents which are easily mass produced and weaponized. Complete lists with detailed discussion can be found in AFJMAN 32-4008, *Technical Aspects of Chemical Warfare Agents*, and AFJMAN 32-4009, *Technical Aspects of Biological Warfare Agents*.

Table 1.1. Selected CB Warfare Agents.

CHEMICAL AGENTS			
Class	**Agent**	**Onset of Symptoms**	**Effects**
Nerve	GA (Tabun) GB (Sarin) GD (Soman) GF (Cyclosoman) VX (No Common Name)	1-5 minutes inhalation 30-60 minutes skin absorption	Difficulty in breathing; drooling and excessive sweating; nausea, vomiting, cramps, loss of bladder/bowel control; twitching, jerking, staggering; headache, confusion, drowsiness, coma, and convulsions.
Blister	HD (Distilled Mustard HN (Nitrogen Mustard)	1-12 hours skin and inhalation	Inflammation of the eyes, nose, throat, trachea,
	L (Lewisite)	5 minutes to 1 hour skin and inhalation	bronchi and lung tissue; reddening of the skin, blistering and ulceration.
BIOLOGICAL PATHOGENS			
Disease	**Causative Agent**	**Incubation Time (Days)**	**Effects**
Anthrax	Bacillus anthracis	1-7	"Influenza like" symptoms, respiratory distress and circulatory shock follow shortly with death common within 1-2 days of the onset of respiratory distress.
Brucellosis	Brucella group	5-21	Irregular prolonged fever, profuse sweating, chills, pain in joints and muscles, fatigue.
Plague	Pastuerella Pestis	2-6	Rapid course of high fever, extreme weakness, glandular swelling, and pneumonia.
Tularemia	Francisella tularensis	1-10	Sudden onset of chills, fever, and prostration, with a tendency for pneumonia to develop.

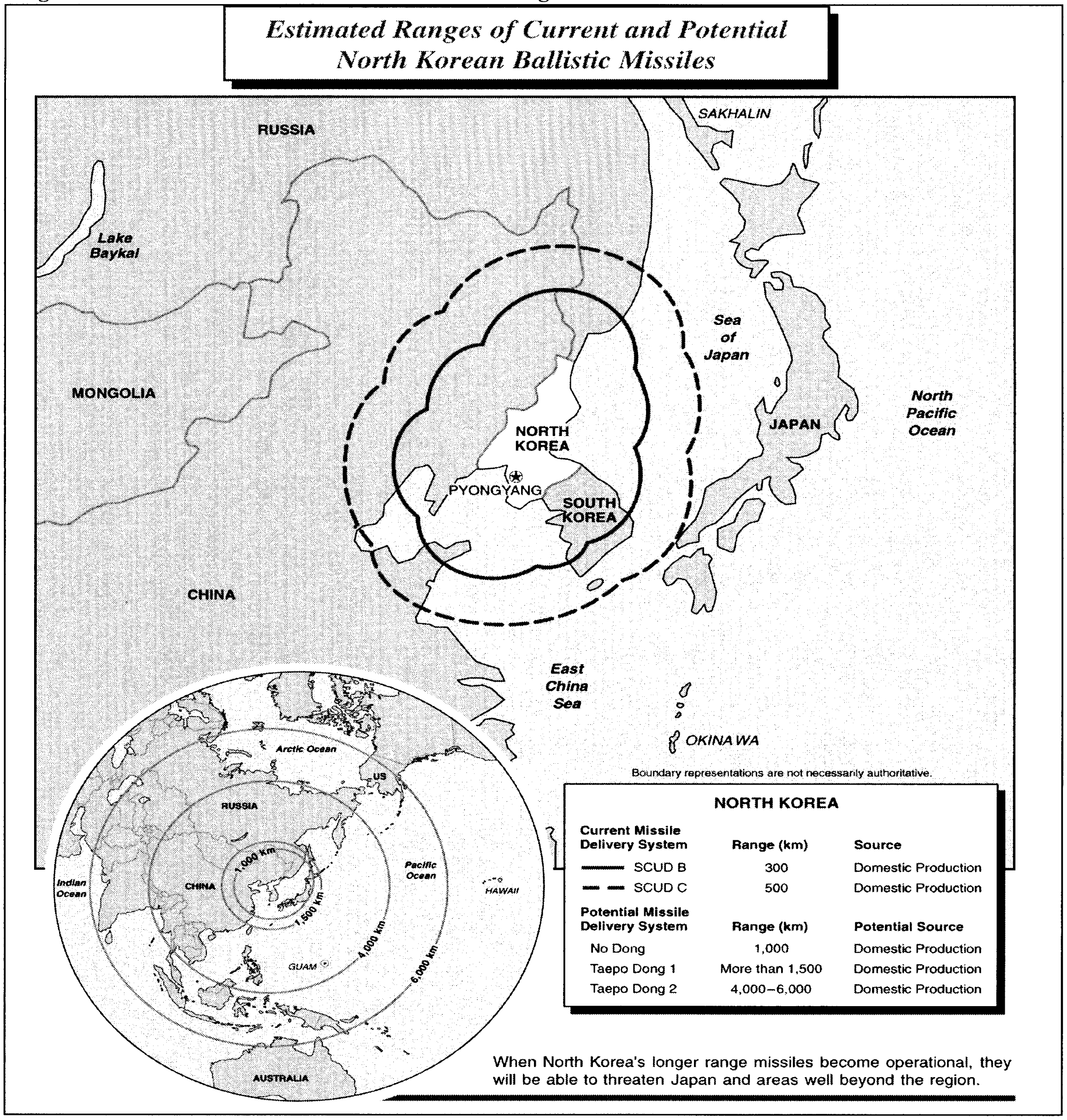
Cholera	Vibrio cholerae	1-5	Sudden onset of nausea, vomiting, profuse watery diarrhea with “rice-water” appearance, rapid loss of body fluids, toxemia, and collapse.
BIOLOGICAL TOXINS			
Toxin	**Source**	**Onset of Symptoms**	**Effects**
Botulinum Toxin (botulism)	Clostridium botulinum	12-72 hours	Weakness, nausea and profuse vomiting, drooping eyelids, double vision, dilated pupils, fever, paralysis.
Staphylococcus enterotoxin B (SEB)	Staphylococcus aureus	1-6 hours	Rapid acute food poisoning symptoms, vomiting, diarrhea, painful cramps.

1.3. Proliferation. The May 1997 Report of the Quadrennial Defense Review (QDR) concluded that the threat or use of chemical or biological weapons is a likely condition of future warfare and could occur in the early stages of war to disrupt US operations and logistics. These weapons may be delivered by ballistic missiles, cruise missiles, aircraft, special operations forces, or other means. In many of the world’s regions where the United States is likely to deploy forces - including Northeast Asia and the Middle East - potential adversaries have chemical and/or biological weapons and the missile systems to deliver them. Potential adversaries may seek to counter American conventional military superiority using less expensive and more attainable, asymmetrical means, including CB weapons. To meet this challenge, as well as the possibility that CB weapons might also be used in some smaller-scale contingencies, US forces must be properly trained, exercised, and equipped to operate effectively and decisively in the face of CB attacks.

1.3.1. In future conflicts, the United States may be faced with an ever-growing array of newly developed chemical and biological agents. At least 25 countries either possess or are developing WMD. Of these 25 countries, North Korea, Iran, Iraq, Libya, and Syria are considered the top five CB threats. **Figure 1.1.** and **Figure 1.2.** illustrates the ballistic missile range from some of these threat countries.

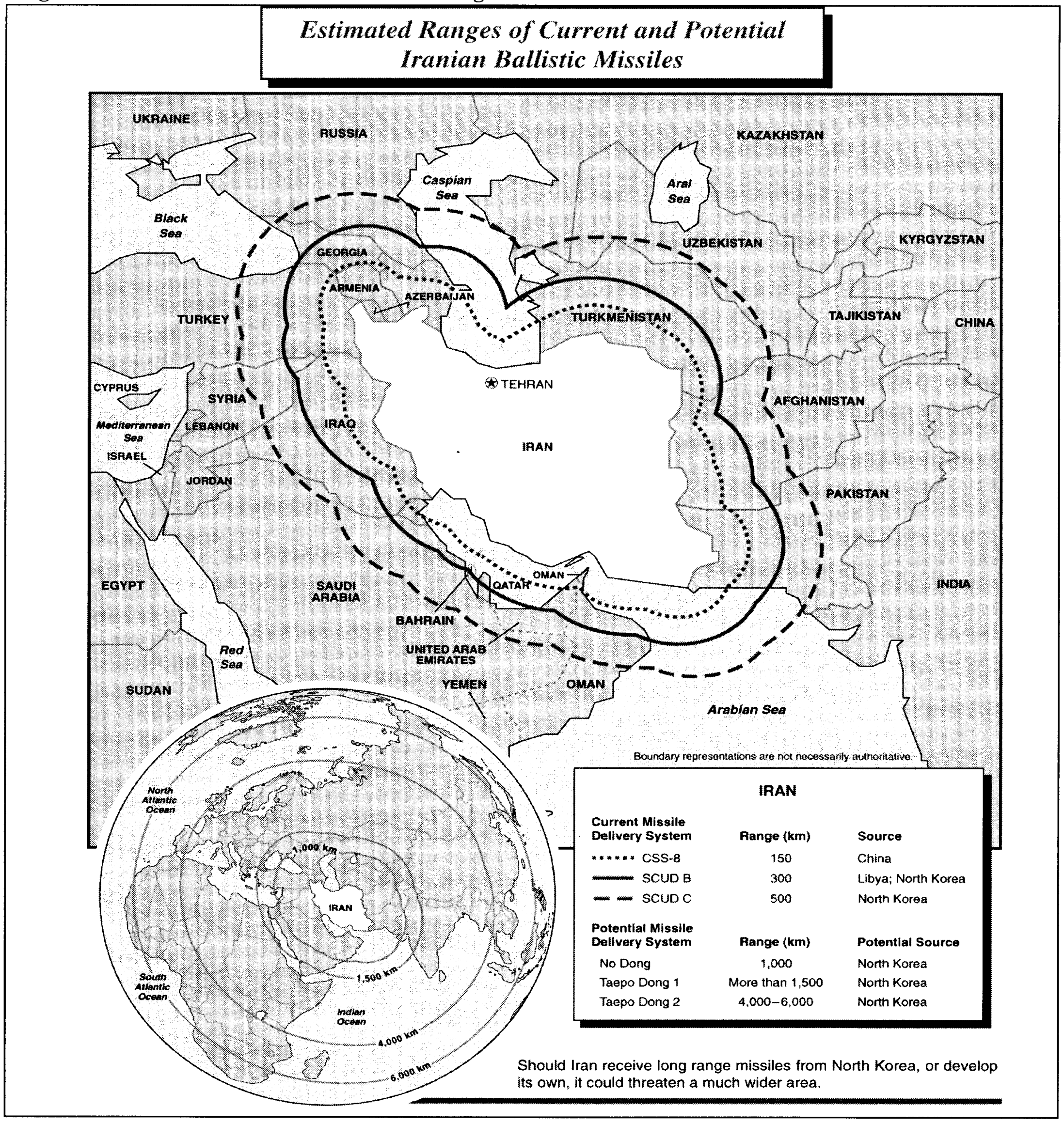
1.3.2. Proliferation, particularly the broad-based CB weapons and missile programs that North Korea has implemented, poses a significant challenge to US security interests, as well as to those of US allies and friends. The North Korean NBC weapons and missile programs have the potential to set off destabilizing arms races and heighten tensions throughout the region.

Figure 1.1. North Korean WMD Ballistic Missile Range Estimates.



1.3.2.1. In the event of another war on the Korean peninsula, CB weapons present a significant threat to US forces and the security of US allies. Should a conflict occur, North Korea would likely try to consolidate and control strategic areas of South Korea by striking quickly and attempting to destroy allied defenses before the United States can provide adequate reinforcements. Pyongyang would most likely attempt to accomplish this with its large conventional force and its chemical weapons and ballistic missiles.

Figure 1.2. Iranian WMD Ballistic Missile Range Estimates.



1.3.3. Iraq is a prime example of success by a nation in rapidly developing a CB arsenal while keeping the effort concealed. Iraq began to develop bacteriological strains in 1986, and the magnitude of their program was not fully known until after Operation Desert Storm (ODS). Prior to Operation Desert Storm, Iraq had the largest and most advanced biological program in Middle East but did not admit to the production of biological weapons until 1995. This occurred despite ratifying the Biological and Toxin Weapons convention. The international community has since learned that Saddam Hussein possessed lethal agents including anthrax and botulinum. The threat of Saddam Hussein's capabilities has been demonstrated by his live firings of 122mm rockets with deadly agents and his testing of bio-agents on animal livestock.

1.3.3.1. Since ODS the UN Special Commission (UNSCOM) in charge of Iraqi disarmament discovered documents that showed Iraq has produced and weaponized 20,000 liters of botulinum toxin, 8,500 liters of anthrax, 2,200 liters of aflatoxin, and the biological agent Ricin. They also found Iraq had flight-tested a MIRAGE F-1 aircraft spray tank designed to dispense biological weapons, and possessed 25 SCUD missile warheads and 166 aerial bombs filled with biological agents. Iraq has claimed to have destroyed all of its biological agents from 1991. They have also showed a willingness to use biological weapons during the Gulf War when they had 25 scud missiles and 166 aerial bombs filled with biological agents. Iraq has sufficient experience in biological warfare, research and development, to quickly resume a small-scale BW program at known facilities that currently produce legitimate items such as vaccines and other pharmaceuticals.

1.3.3.2. Iraq had a variety of chemical warfare agents available before the Gulf War, including distilled mustard, tabun and sarin nerve agents. They also admitted flight-testing long-range SCUD missiles with warheads designed for chemicals, including a flight test with a live chemical warhead with a range of 600-650 KM. In addition, Saddam Hussein used Mustard gas against Iranian forces on five separate occasions and a nerve agent twice as well as using chemical agents against his own Kurdish citizens. Saddam actually weaponized chemical weapons and deployed it to field commanders for use during the Gulf War.

1.3.3.3. UNSCOM recently discovered that Iraq had enough chemical stockpiles to produce 10 tons of storable VX persistent nerve agents. In the period from August to October 1997 alone, UNSCOM supervised the destruction of 325 pieces of newly identified production equipment, 125 pieces of analytical instruments and 275 tons of precursor chemicals. Iraq continues to conceal a small stockpile of chemical weapons including agents, munitions and production equipment and has not supplied adequate evidence to support its claims of previous compliance, including:

1.3.3.3.1. Unaccounted VX nerve agent program sufficient to produce 20 to 160 tons of deadly nerve agent.

1.3.3.3.2. Has not signed the Chemical Weapons Convention (CWC).

1.3.3.3.3. Claims unilateral destruction of 130 tons of chemical weapon agents. (Undocumented and unverified)

1.3.3.3.4. Failed to account for the large pre-war (Gulf) stocks of mustard gas and Sarin nerve agent artillery shells.

1.3.3.3.5. Retains technical expertise to restart chemical weapons production.

1.3.3.4. The Iraqi program should be viewed as an indicator that other nations, or groups may seek the means to develop their own weapons. The relative ease and inexpense of manufacturing CB agents and the ability to inflict high casualty rates in military and civilian populations creates a preference for CB weaponry by third world nations.

Chapter 2

THE BASE-LEVEL CB DEFENSE PROGRAM

2.1. Principles of CB Defense. Consistent with DoD guidance, the base-level CB defense program follows the three basic principles of CB defense which are avoidance, protection, and contamination control (defined as decontamination in Joint Pub 3-11). Under each principle is a set of elements that further define actions which are necessary for sustained USAF operations in a CB contaminated environment.

2.1.1. The principle of avoidance includes the elements of detection, identification, prediction, warning, reporting, marking, and relocation or rerouting.

2.1.2. The protection principle includes typical CB defense measures involving use of individual protective equipment, shelters, and specific medical countermeasures.

2.1.3. The contamination control principle includes a variety of contamination containment and avoidance activities as well as decontamination actions.

2.2. Avoidance. To maximize the ability of US forces to respond quickly and accurately to a CB attack, a system that provides for the detection, identification, and warning of CB contamination is of paramount importance. Real-time or near real-time communication, both internally and externally to the base, networked through air, land, sea, and space forces, is required to ensure joint CB command and control effectiveness.

2.2.1. There are three methods of detection used to provide warning of CB threats and attacks. First, strategic detection and warning of incoming missiles and aircraft will come from satellite imaging or from airborne command and control platforms. Second, operational detection and warning will come from intelligence estimates, operation orders, or direct communications with higher headquarters, joint service, or host nation forces reporting a CB event. The third method is tactical detection that is provided internally through the base from detectors, CB reconnaissance teams, and base personnel. For biological agents, reports from the medical facility that patient symptoms or medical tests indicate exposure has occurred may be the only indication of attack.

2.2.2. Immediate warning through audio/visual or physical means is important to reduce exposure of base personnel. Giant Voice systems, flags, radio communication with flightline personnel, maintenance and repair shops, and control centers are all viable methods of communication. **Figure 2.1.** illustrates standard USAF alarm signals. Activating the Nuclear, Biological and Chemical Warning and Reporting System (NBCWRS) to rapidly and accurately forward information on CB events must not be delayed.

Figure 2.1. Attack Signals.

USAF STANDARDIZED ALARM SIGNALS

FOR AREAS SUBJECT TO NBCC ATTACK

IF YOU	FOR A CONVENTIONAL PROTECTIVE POSTURE YOU MUST	FOR A CHEMICAL/ BIOLOGICAL PROTECTIVE POSTURE YOU MUST
HEAR: "ALARM YELLOW" SEE: A YELLOW FLAG	ATTACK IS PROBABLE (PRE-ATTACK) DON HELMET AND AVAILABLE BODY ARMOR GO TO SHELTER WHEN DIRECTED	ATTACK IS PROBABLE (PRE-ATTACK) DON HELMET AND AVAILABLE BODY ARMOR GO TO SHELTER OR SEEK OVERHEAD PROTECTION WHEN DIRECTED ASSUME MOPP 1 UNLESS OTHERWISE DIRECTED
HEAR: "ALARM RED", A 1 MINUTE WARBLING TONE ON SIREN OR BLASTS ON HORNS, WHISTLES, BUGLES, ETC 3 SECONDS ON - 1 SECOND OFF SEE: A RED FLAG	ATTACK IS IMMINENT OR IN PROGRESS (TRANS-ATTACK) TAKE COVER	ATTACK IS IMMINENT OR IN PROGRESS (TRANS-ATTACK) TAKE COVER ASSUME MOPP 4 UNLESS OTHERWISE DIRECTED
HEAR: "ALARM BLACK", "GAS-GAS-GAS", A BROKEN WARBLING TONE ON SIRENS OR BLASTS ON HORNS, WHISTLES, BUGLES, ETC (1 SECOND ON - 1 SECOND OFF) OR CONTINUOUS BEATING OF METAL ON METAL SEE: A BLACK FLAG	ATTACK IS OVER (POST-ATTACK) GO TO OR STAY IN SHELTER UNLESS OTHERWISE DIRECTED INITIATE POST ATTACK RECONNAISSANCE	NBC CONTAMINATION IS EXPECTED OR PRESENT (POST-ATTACK) GO TO OR STAY IN SHELTER UNLESS OTHERWISE DIRECTED INITIATE POST ATTACK RECONNAISSANCE ASSUME MOPP 4 UNLESS OTHERWISE DIRECTED
HEAR "ALL CLEAR"	ATTACK IS NOT PROBABLE, NOR IS NBC CONTAMINATION PRESENT RESUME NORMAL OPERATIONS OR INITIATE RECOVERY IF APPLICABLE	ATTACK IS NOT PROBABLE, NOR IS NBC CONTAMINATION PRESENT RESUME NORMAL OPERATIONS OR INITIATE RECOVERY IF APPLICABLE

Local Information: Policies and procedures may vary at deployed locations/theaters. For example, the Republic of Korea deviates with Alarm Blue and Alarm Green. Other variations include using lights in addition to flags as visual indicators.

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2.3. Protection . Protection is afforded by individual protective equipment, shelters, and medical countermeasures. Mission Oriented Protective Postures (MOPP) allow the individual to escalate their protective posture based on the threat of imminent attack and accomplish operations by balancing mission continuation and force survivability.

2.3.1. Individual Protective Equipment (IPE). IPE protects the wearer from exposure to CB agents. Individual protection consists of a mask, which keep CB agents from entering the body through the nose, mouth, or eyes; and an overgarment, hood, gloves, and overboots which protect against skin contact hazards or keeps agent from entering the body through cuts or abrasions of the skin and from penetrating the skin. Masks provide the immediate protection from inhalation hazards and the balance of the protective ensemble generally enhance the protection offered by normal combat clothing.

2.3.2. Shelters. Shelters are structures that protect personnel from exposure to CB contamination. As a minimum, they provide a physical barrier that keeps a portion of the contamination away from the people inside. When attacks against an airbase occur, personnel take shelter to protect themselves from possible hazards from an attack, which can include blast, heat, shrapnel, and contamination, depending on the type of weapons employed. Restricting flow of air into a shelter increases its value as a CB shelter. Unless employed in combination with other types of weapons, CB weapons normally involve less destructive force, so agents can be disseminated without being destroyed in the dispersal process.

2.3.2.1. Collective protection (ColPro) systems protect those inside a building, room, shelter or tent against contamination through the combination of impermeable structural materials, air filtration equipment, air locks, and overpressurization. ColPro systems reduce contamination levels when personnel enter or exit the structure. They enable personnel to work or gain rest and relief without the encumbrance of IPE. If ColPro systems are not available for all base personnel beyond a few hours, it may become necessary to locate and designate open-air, toxic-free areas (TFAs) for rest and relief.

2.3.2.1.1. Currently, there are three primary types of ColPro systems. The first type is ColPro built into critical work areas such as squadron operations centers, wing command posts, communications centers, hospitals and avionics maintenance facilities. A number of these systems are currently in some CB threat areas. The second type of ColPro, survivable collective protection systems (SCPS), are underground rest and relief shelters positioned near operational areas. The third type, transportable ColPro, is deployable and has three variations that can protect work areas or rest and relief areas. One variation fits inside of rooms within buildings, another protects deployable shelters, and a third stands alone.

2.3.2.1.2. PACAF is taking the lead in developing a concept of operations for ColPro. Their initial goal is to provide on-base collective protection to protect sortie generation personnel and protect key leadership personnel in Korea. Their program is starting with the repair of existing collective protection facilities. The next priority is to provide expedient protection with the M28 Simplified Collective Protection Equipment (SCPE) within existing facilities or by using the M28 inside existing Tent, Expandable Modular Personnel (TEMPER) tents. Where practical, collective protection will be located at or near mission areas. Using on-base, open-air contamination control areas (CCAs) will protect the remainder of the base populace.

2.3.2.1.3. Sealed and closed structures offer some protection. In the absence of dedicated ColPro systems, the inherent features of some buildings offer protection not otherwise available. Walls, doors, and windows offer physical barriers to the penetration of contamination. Wearing a mask inside such structures increases the protection for the wearer.

2.3.3. Medical Countermeasures. Recently, there have been several accomplishments in the development of medical countermeasures against CW/BW agents. Medical countermeasures fall into three basic categories: prophylactic (preventative), therapeutic (post-exposure), and diagnostic. Key accomplishments of prophylactic countermeasures include the continued development of advanced vaccines for anthrax, botulinum, ricin, Venezuelan equine encephalitis, and plague. Key accomplishments of therapeutic countermeasures include further development of a reactive topical skin protectant for protection against nerve and mustard agents; development of a nerve agent multichambered auto-injector (to replace the multiple injections currently required). Key accomplishments for diagnostic countermeasures include the continued development of a forward deployable diagnostic kit (including agent identification capability) that will provide rapid identification of BW agents and allow immediate diagnosis of BW-related casualties in the field. These diagnostic kits are not currently available in USAF inventories.

2.3.3.1. For a number of biological warfare (BW) agents, the primary means of continuous medical protection is active immunoprophylaxis, through the administration of vaccines. In some cases, the only available medical countermeasure may be the administration of specific antisera. The following paragraphs paraphrase the DoD directive on immunization for BW agents, which mentions vaccines only; undoubtedly, the policies and procedures for antisera administration would be similar.

2.3.3.2. Vaccine administration, most often in multiple doses, should occur prior to exposure to BW agents. Vaccines are available for many, but not all of the potential BW agents. DoD policy calls for immunization against validated BW threat agents for personnel assigned to CB threat areas, personnel pre-designated for immediate contingency deployment, and personnel scheduled for deployment to an imminent or ongoing contingency operation in a CB high threat area. This policy is contingent on the availability of suitable vaccines and requires timely immunization for protection/immunity before personnel enter the threat area.

2.3.3.3. Coordinated direction for immunization of appropriate personnel comes to the Secretary of the Air Force from the Assistant Secretary of Defense for Health Affairs. This direction is based on BW threat assessments originated by the Commanders of the Unified Commands, as validated and prioritized by the Chairman of the Joint Chiefs of Staff, in consultation with the aforementioned Commanders, the Chiefs of the Military Services, and the Director, Defense Intelligence Agency (DIA). USAF Commanders and medical personnel should know how the vaccination program will affect their units and prepare their personnel accordingly.

2.3.3.4. Chemoprophylaxis involves the use of broad-spectrum antibiotics to combat the effects of BW agents. It is an option for attacks that either are expected or have occurred. For some agents, administration of antibiotics following exposure but before symptoms appear can be effective. In other cases, post-exposure but pre-symptomatic use of antibiotics in conjunction with vaccines is the best action for those not previously vaccinated. In certain instances, use of antibiotics in this manner will suppress the occurrence of disease long enough to perform the mission.

2.4. Contamination Control. By definition, contamination control includes procedures for avoiding and marking post-attack contamination, as well as reducing, removing or rendering harmless, the hazard resulting from the contamination. Of these components, contamination avoidance before an attack is the most effective, cheapest, and easiest to perform. From a practical standpoint, BW contamination control is a combination of standard disease prevention measures, which may include quarantine of infected personnel, depending on the biological agent, and traditional CW contamination avoidance and decontamination measures.

2.4.1. Contamination Avoidance. In general, contamination avoidance includes actions to prevent contamination from getting on mission-essential resources and personnel, whether directly from agent deposition or by transfer from contaminated surfaces. Contamination avoidance actions include the use of protective covers or coatings and removal of these covers or coatings after a CB attack upon entry into uncontaminated areas. Similarly, contamination control area (CCA) processing is a form of contamination avoidance. Additionally, restriction of movement constitutes a form of contamination avoidance.

2.4.2. Contamination Control Areas. CCAs are essential to sustained operations in a CB environment. They provide controlled entry areas, force personnel to practice effective contamination avoidance procedures, and limit the spread of contamination into toxic free areas (TFAs). TFAs provide personnel the ability to work or obtain rest and relief without wearing IPE. The hostile use of chemical agents against USAF operating locations will almost certainly force the creation of CCAs, regardless of the agent or external factors involved. One or both of the following situations will likely occur after the attack.

2.4.2.1. If an air base is attacked with chemical agents, the persistency of the agents may necessitate MOPP gear wear for extensive periods of time. Consequently, the work force will require some form of rest and relief shelter in order to sustain mission operations. Rest and relief will primarily be accomplished by processing people through a CCA into a TFA.

2.4.2.2. A very small percentage of the base population will have their chemical protective clothing contaminated at the time of the attack because they could not find adequate overhead protection. Still others will contaminate their protective clothing during post-attack operations. This contaminated clothing must be removed as soon as possible but absolutely within 24 hours. The exchange of contaminated clothing for clean protective clothing will take place at the CCA. Delay (if possible) processing personnel into the CCA with liquid contamination of their suits. This will allow the suits to aerate and reduce cross-contamination hazards in the CCA.

2.4.3. Isolating key resources (i.e. covering, sheltering aircraft, etc.) prior to CB contamination has a direct and significant impact on limiting the spread of contamination and therefore, reducing the need for decontamination. Contamination avoidance planning and early detection of CB dissemination (detection of missiles, aircraft attacks, or enemy CB activities) triggers the use of contamination avoidance procedures and protects personnel through use of individual protective equipment. Post attack detection and marking of contaminated areas decreases the inadvertent spread of contamination, thereby reducing future decontamination operations.

2.4.4. Decontamination. The four types of decontamination are immediate, operational, thorough, and reconstitution. Immediate decontamination would be those actions done by personnel on themselves or their personal equipment. Operational decontamination consist of actions to reduce or minimize the contact hazard associated with contamination located on specific parts of mission essential equipment, materials or work areas. This and immediate decontamination are the primary levels of decontamination that will be achieved at unit level. Thorough decontamination consists of activities taken to reduce contamination to the lowest possible level and thereby achieve a reduction in MOPP level. The reconstitution level of decontamination will primarily be required in a post-contingency environment. The objective is to eliminate contamination and restore critical resources in a manner that permits unrestricted use, handling or operation without individual protective equipment, and allows release of the asset from military control.

2.4.4.1. Decontamination is a manpower, time, and resource consuming process which should be limited to actions that are absolutely necessary to permit mission accomplishment. Decontamination systems do not offer the capability to rapidly decontaminate large areas to reduce overall hazard levels. Natural decontamination (decay or weathering) is the most cost effective and easiest of the decontamination methods, however, mission needs will not always allow this as an option.

2.4.4.2. When decontamination of mission essential equipment is necessary, efforts should be consistent with available resources and the contamination's effect on critical mission operations. Limit decontamination operations to those actions necessary to minimize contact hazards and to limit the spread of contamination to both personnel and equipment.

2.4.4.3. There are limited numbers of equipment items in the inventory specifically identified for decontamination. Individual decontamination kits are issued to all personnel for decontamination of the skin and personal equipment. There are, however, many common materials available for decontamination, to include items such as bleach, disinfectants, soap, and water. Future production of non-toxic, non-corrosive decontaminates will enhance decontamination operations.

Chapter 3

CB DEFENSIVE ACTIONS

3.1. Elements of CB Defense. Relating the three principles and the associated elements of CB defense to an effective base-level program is easily described by examining a chronological sequence of CB defensive actions. These defensive actions are provided in Table 3.1.

Table 3.1. CB Defense Actions.

DEPLOYMENT	**Evaluate Enemy Capability** ☑ Production, ☑ Agents, ☑ Delivery Systems, ☑ Employment Doctrine
	Identify, Train and Equip Specialized CB Teams ☑ Assessment, ☑ Contamination Control, ☑ Shelter, ☑ Reconnaissance
	Establish CB Defense Plans ☑ Detectors, ☑ Communications, ☑ Shelters
	Obtain Required Immuno/Chemo-Prophylaxis Treatment
	Evaluate and Correct Unit Status ☑ Individual Training, ☑ Individual Protective Equipment, ☑ CB Protective Shelters, ☑ Medical Supplies and Equipment, ☑ Decontamination Equipment, ☑ Detection Equipment ☑ Vaccine Status
	Conduct Training Exercises for CB Defense
PRE - ATTACK	**Evaluate and Monitor CB Intelligence** ☑ Enemy Defensive Equipment locations, ☑ Enemy CB Training and Exercise Status ☑ Enemy Vaccine/Immunity Status, ☑ Enemy CB Facility Locations
	Disperse Pre-positioned Individual CB Equipment ☑ Check CMBCC Equipment, ☑ Check WRM equipment
	Implement Appropriate MOPP
	Activate CB Defense Plan ☑ Deploy Specialized Teams and Equipment, ☑ Detectors (arrays & networks) ☑ Communications (Medical/Intelligence Networks, Warning & Reporting), ☑ Shelters ☑ Cover All Mission Essential Equipment, ☑ Environmental & Medical Baselines ☑ Disease Analysis (non-battle injuries)
	Review/Refine Reconstitution and Relocation Plans ☑ Toxic Free Areas
	Implement Sanitation and Hygiene Measures
	Continue Medical Protective Treatments
	Conduct Training Exercises for CB Defense
ATTACK	**Monitor Warning and Reporting System for Reports of CB Attacks**
	Monitor Intel/Airborne Radar Data
	Issue Base Wide Warning ☑ Activate Attack Alarm, ☑ Implement Appropriate MOPP
	Monitor CB Attack Indicators ☑ Detector Response, ☑ Casualty Data, ☑ Environmental Data
POST-ATTACK	**Confirm CB Attacks** ☑ Multiple Detector Responses, ☑ Casualties, ☑ Lab Analysis
	Implement Appropriate MOPP
	Issue CB Reports ☑ Time & Location of Attack, ☑ Weather Data, ☑ Downwind Predictions
	Implement Contamination Avoidance Procedures
	Implement Casualty Care
	Survey for Extent of Damage and Contamination and Evaluate CB Impact on Mission Sustainment ☑ Reconstitution, ☑ Relocation, ☑ Gather CB Samples
	Establish Decontamination Priorities
	Evaluate and Adjust Protective Measures
	Monitor Warning and Reporting System for Reports of CB Attacks and Monitor Intel/Airborne Radar for Follow-On Attacks.

3.2. CB Defensive Actions. The following paragraphs provide a brief description of each CB defensive action, the agency responsible for ensuring the action is accomplished, and the approximate time when the action should be initiated. It should be noted that this list is not all-inclusive. There will be special circumstances such as host nation support agreements, mission requirements, and available resources that necessitate tailoring this list to specific installation needs.

3.2.1. Deployment Actions. The following actions should be accomplished prior to, or immediately after, deployment to a CB high threat location:

3.2.1.1. Evaluate Enemy Capability. Evaluation of the enemy capability prior to deployment will facilitate planning for possible CB defense procedures. During this phase, the evaluation should concentrate on enemy capabilities in terms of chemical or biological agent production, delivery systems and historical employment doctrine. Based on this information, CB plans can be developed for specific threats in specific regions. The evaluation should be accomplished by a cross section of installation personnel to include civil engineer, intelligence, medical, operations and security forces. Table 3.2. provides some insight into the historical and current capability of NE Asia and SW Asia.

Table 3.2. WMD Weapons and Missile Programs.

	IRAQ	NORTH KOREA
Chemical	Suffered considerable damage from Coalition bombing and UNSCOM destruction. Probably has hidden precursor chemicals, agents, munitions, documentation for future effort; has rebuilt key portions of production facilities for commercial use. Could restart agent production and have small usable stockpile in several months, if sanctions and monitoring were lifted or substantially reduced. Has not signed the Chemical Weapons Convention.	Produces and is capable of using wide variety of agents and delivery means, which could be employed against US and allied forces. Has not signed the Chemical Weapons Convention.
Biological	Prior to Operation Desert Storm, had largest and most advanced program in Middle East. Despite Coalition bombing, UNSCOM destruction, and UN sanctions and monitoring, Iraq may retain elements of its old program, including some missile warheads. Could restart some limited agent production quickly, if sanctions and monitoring were lifted or substantially reduced. Ratified the Biological and Toxin Weapons Convention.	Pursued biological warfare research and development for many years Possesses biotechnical infrastructure capable of supporting limited biological warfare effort Ratified the Biological and Toxin Weapons Convention

Ballistic Missiles	Suffered considerable damage from Coalition bombing and UNSCOM destruction.	Produces and is capable of using SCUD B and SCUD C missiles.
	Allowed to maintain 150-kilometer missile program (Ababil) under UNSCR 687; likely using this effort to support future long range missile effort.	Developed the No Dong Missile (approximately 1,000 kilometers).
	Continues to conceal a number of SCUD missiles and launchers.	Developing longer range missiles: Taepo Dong 1 (more than 1,500 kilometers) and
	Could restart limited missile production within one year, if sanctions and monitoring were lifted or substantially reduced.	Taepo Dong 2 (4,000-6,000 kilometers).
	Not a member of the Missile Technology Control Regime	Not a member of the Missile Technology Control Regime.
Other Means of Delivery Available	Land-launched anti-ship cruise missiles; air-launched tactical missiles; none have CB warheads; stockpile likely is very limited.	Land- and sea-launched anti-ship cruise missiles; none have CB warheads
	Aircraft (fighters, helicopters).	Aircraft (fighters, bombers, helicopters).
	Ground systems (artillery, rockets)	Ground systems (artillery, rocket launchers, mortars, sprayers).

3.2.1.2. Identify, Train, and Equip Specialized CB Teams. Individual unit commanders must identify and equip personnel for augmentee duty to specialized teams in support of base CB defense programs. Specialized teams for each installation minimally consist of shelter, contamination control (decontamination), reconnaissance, and CB plotting and reporting. Civil engineer readiness personnel provide general CB defense training for the base populace, as well as specialized training for shelter, contamination control, readiness support teams, and other augmentees, as appropriate.

3.2.1.3. Establish CB Defense Plans. The Civil Engineer Readiness Flight works with individual unit commanders in establishing coordinated and detailed plans for CB defense. These plans should specify local responsibilities, procedures, and relationships for all phases of CB defense. As a minimum, plans must address the placement and monitoring of CB detectors around the base, ensuring a communications system is in place to warn personnel of attacks, designating shelters to protect personnel, and the locations of specialized teams and equipment to support post attack reconnaissance and recovery actions. Plans should also be established for the protection of food and water sources as well as sanitation and hygiene measures.

3.2.1.4. Immunize Personnel. Personnel will receive prophylactic vaccinations administered by medical personnel based on DoD direction. The flight surgeon should ensure commanders are aware of any side effects of vaccines or antibiotics that might detract from air crew performance.

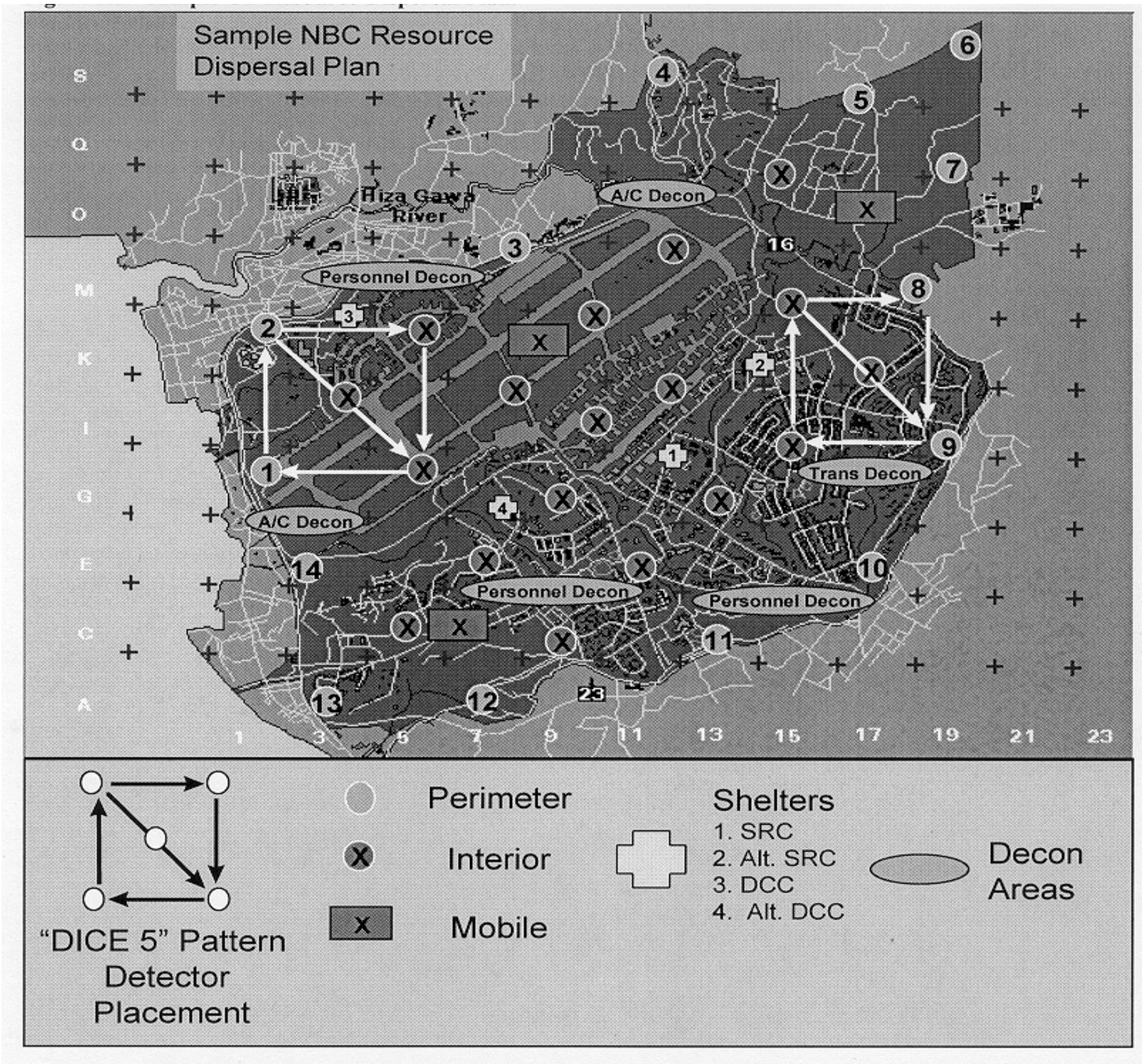
3.2.1.5. Evaluate and Correct Unit Status. Throughout the deployment phase, unit commanders should monitor the status of CB defense programs through the Civil Engineer Readiness Flight.

All personnel must be equipped and trained to respond to CB attacks. Particular attention should be given to the status of individual protective equipment, specialized team equipment, and supplies prior to deployment.

3.2.1.6. Training and Exercises. Although training and exercising in CB IPE is often stressful, the value on return cannot be over stated. First and foremost, training and exercising acclimates personnel to the thermal effects of wearing IPE for sustained periods of time. More importantly, exercising in IPE reinforces training and identifies those tasks that require additional time or resources to accomplish because of the limitations associated with CB protective equipment and defensive measures.

3.2.2. Pre-Attack Actions. The following actions should be accomplished after deployment and before CB weapons are used. Many of the actions undertaken prior to and during deployment will continue up to and even after the time CB attacks occur. Commanders must ensure that personnel remain prepared through training and exercises. AFI 32-4001, Disaster Preparedness Planning and Operations, establishes CB defense policies and planning guidance. Basic requirements for individual equipment and training apply to all personnel stationed in or deployable to CB threat areas. The following are specific actions that should occur during the deployment phase up to the time an attack occurs and CB defense employment operations commence. **Figure 3.1.** depicts a sample base with deployed CB assets and the locations of specialized teams and activities. Personnel will be required for these duties even though the current UTC deployment system does not accommodate deploying personnel for jobs outside of their AFSC taskings(s). Since there may not be time to identify and train these personnel once the unit arrives at its deployed location, commanders should strongly consider identifying and training these personnel prior to deployment.

Figure 3.1. Sample CB Resource Dispersal Plan.



3.2.2.1. Evaluate and Monitor CB Intelligence. Evaluation of CB intelligence during the pre-attack phase should be concentrated on looking for indications of potential use of CB warfare. Particular attention should be paid to the enemy's operational CB capabilities during this phase. Intelligence should provide information concerning the movement of CB munitions to forward locations in preparation for use. Other intelligence information that are key indicators of potential CB attacks include increased enemy CB defense training and the establishment of vaccine and immunization programs.

3.2.2.1.1. There are no direct means to ascertain whether an attack against an installation will include CB weapons. In very few, if any, cases would there be enough time between warning and occurrence of an attack to adequately consider available information and decide on the likelihood of use of CB weapons. Accordingly, commanders must continuously monitor intelligence assessments, situation reports, and other related information to prepare themselves to make an informed decision on whether or not to implement CB defense measures prior to, or upon notification of an attack. Other important factors would include the time of day, weather conditions, mission demands, fitness level, training status, and equipment status. CB intelligence should be continuously monitored until hostilities cease.

3.2.2.2. Disperse CB Equipment. Immediately after arrival, unit commanders should ensure CB equipment is dispersed to work areas, shelters, and other designated locations. All personnel should have carried two sets of protective clothing, to include a mask, when they deployed, to provide immediate protection at the deployment location and any intermediate stops. Spare IPE can be shipped separately for each person, or it can be shipped in bulk, which must then be distributed, to the individual's work area and shelter. Regardless of the method, it is strongly recommended to disperse spare IPE as soon as possible and not centrally store it. Units must develop a method of getting spare IPE to the toxic free areas for reissue to personnel when they leave these rest and relief areas and return to work in a contaminated environment.

3.2.2.2.1. Civil engineer and medical units should disperse and activate pre-identified CB equipment and supplies for detection, decontamination, and medical treatment purposes. Examples of this equipment include automatic detectors (when available), sampling and analysis equipment, decontamination systems and supplies, antibiotics, and vaccines. Requirements for disbursement of antibiotics, vaccines, and other medical supplies will depend on the threat at the deployment location(s). It also depends on how many doses of vaccine the deploying personnel received before they deployed.

3.2.2.3. Activate CB Defense Plan and Implement Appropriate MOPP. If the Commander has decided during the pre-attack period that the threat of CB attack is sufficient, the base must assume an appropriate defense posture. As the base progresses through various stages of alert, CB attack preparations occur concurrently with preparations for conventional attack. Pre-attack measures include disseminating protective gear, declaring MOPP levels, distributing antidotes and initiating pre-treatments, activating collective protection systems, deploying and activating detection and warning systems, covering supplies and equipment, and readying decontamination systems. Commanders should disperse critical personnel as much as the operational situation permits.

3.2.2.3.1. CE Readiness and Bioenvironmental engineers will deploy available detectors to pre-established locations according to detector placement plans. These locations may include sites upwind of the base, sites along and at the corners of the base perimeter, and random sites on the base itself. If biological detectors are not available, the Theater Commander-in-Chief (CINC) should be contacted to ensure appropriate detection and warning is available. The bioenvironmental engineer will disperse sampling supplies and equipment, and prepare to conduct sampling in coordination with CE Readiness personnel.

3.2.2.3.2. The Base Civil Engineer, through the CE Readiness Flight, will survey and designate appropriate rest and relief shelters. Protection from CB and conventional weapons effects, such as liquid and vapor contamination, blast, shrapnel, and heat, should determine the suitability of buildings as shelters. In addition the Commander should designate unit responsibility for preparing and operating each shelter and consider all Force Protection issues. Units responsible for the shelters will prepare them by sealing cracks and holes, closing all doors and windows, and preparing to turn off the ventilation systems that don't possess collective protection capabilities. The innermost rooms in buildings without filters make the best shelter areas in terms of the least amount of aerosol and vapor infiltration.

3.2.2.4. Review and Refine Reconstitution and Relocation Plans. Reconstitution and relocation plans should be reviewed and refined as the situation changes. The primary concern for a commander at all levels is ensuring personnel have the means to receive adequate rest and relief during sustained operations in a CB environment. Following an attack with chemical or biological weapons, the USAF has three options for continuing mission operations depending on available assets prior to the attack.

3.2.2.4.1. These options are:

3.2.2.4.1.1. Continue mission operations from the air base with rest and relief facilities located inside the perimeter of the fence.

3.2.2.4.1.2. Continue mission operations from the air base with rest and relief facilities located outside the perimeter of the fence.

3.2.2.4.1.3. Transferring aircraft and some support personnel and continue mission operations from another air base that is not contaminated.

3.2.2.4.1.4. In order to continue mission operations from the air base there must be a capability to provide rest and relief for personnel operating in 8 to 12 hour shifts. ColPro facilities that provide a TFA area are necessary to eat, sleep, and change clothes. Without ColPro, a TFA must be established well outside of the contaminated area. This is quite a challenge for commanders in terms of security, transportation, and logistics. This option may not be viable because of geographical, meteorological, or logistical limitations. If the first two options are not viable then it will be necessary to relocate air assets along with necessary spares and support personnel to another airbase. A general discussion of each of the options follows.

3.2.2.4.2. ColPro facilities can be defined as either work centers or personnel shelters that provide filtered air for a "shirt sleeve" environment. Although work centers do not need to have collective protection, it must be taken into consideration for sustained operations in a contaminated environment. Functional duties performed in command and control facilities such as the command post, survival recovery center, squadron operations and medical facilities without collective protection can be sustained, however the effectiveness will be degraded over time. On the other hand, personnel shelters must have collective protection to provide rest and relief from the contaminated environment, or be located in an area that is free of contamination. ColPro shelters must be designed to provide a means for donning and doffing personal protective equipment as well as an area to work, sleep and eat in an uncontaminated environment. ColPro shelters must contain a contact hazard area for removal of liquid or solid contaminated garments, a vapor hazard area for removal and exchange of contaminated masks, and a toxic free area for work, rest and relief.

3.2.2.4.3. Open-Air Toxic-Free Areas. If personnel shelters do not have collective protection then another means must be provided for rest and relief of personnel. This usually means planning for open-air TFAs which should be located well away from contaminated areas. The TFA must be stocked with provisions just as personnel shelters are. This means stocking enough food, water, and clothing for personnel who are off duty as well as providing accommodations for sleep and sanitation. It is difficult to establish how far from the contaminated base this TFA should be located because of unique geographical locations, but it must be located far enough away from the contaminated area to account for changes in wind speed and direction. If it must be located downwind, select a site 10 to 15 kilometers from a liquid contamination source. Other considerations for establishing the location of a TFA are as follows:

3.2.2.4.3.1. An area for personnel exiting the contaminated area to doff IPE.

3.2.2.4.3.2. Transportation routes between the contaminated base and the TFA must be established. Consider all force protection and security issues (i.e. alternate routes, staggered shifts, physical protection etc.) In many cases these routes may be inaccessible because of local populace evacuating the area.

3.2.2.4.3.3. Sufficient quantity of transportation assets to move personnel and equipment between contaminated and "clean" locations must be identified and on hand.

3.2.2.4.3.4. Bleach solutions and other decontamination assets for establishing decontamination stations in the contact and vapor hazard area must be positioned prior to movement of personnel.

3.2.2.4.3.5. Communications for command and control between the contaminated area, contact hazard area, vapor hazard area, and the clean area must be established. In addition, security cordons must be established around the liquid hazard area, vapor hazard area, and TFA to ensure safety of personnel as well as controlling the spread of contamination.

3.2.2.5. Relocation of Assets. Relocation of assets to an air base is an alternative that can be used in two different scenarios. First, it is the only alternative for continuing mission operations if rest and relief cannot be provided for base personnel within 24 to 36 hours following an attack. Uncontaminated assets and people are easier to move; therefore every precaution should be taken to limit the spread of contamination while relocation is taking place.

3.2.2.5.1. This alternative may also be the best course of action if the contamination on the air base will not be present for long periods of time (non-persistent agents) and airplanes can be recovered at another location that can provide short-term support. When the contamination is no longer present, airplanes can return to the air base and quickly resume operations. The obvious advantage to using this alternative for non-persistent attacks is keeping as many airplanes as clean as possible.

3.2.2.5.2. Knowing the type of attack is a key driver for making a decision to attempt relocation. FM 3-14, Nuclear, Biological and Chemical (NBC) Vulnerability Analysis, define types of attacks as:

3.2.2.5.2.1. High casualty risk . Occurs at winds speeds of 10 km/h or less during slightly stable, stable or extremely stable atmospheric conditions. Agent clouds will produce very narrow and very long hazard clouds. Dosages over 100 times the lethal levels are possible in the hazard area. While the initial casualty risk to warned, protected personnel is low, unprotected personnel are in extreme danger.

3.2.2.5.2.2. High degradation risk . Occurs during stability categories of neutral to very unstable and wind speeds less than 10 km/h. Agent clouds will produce wide hazard areas with lethal effects rarely extending as far as 10 kilometers. The initial casualty risk to warned personnel is low. However, due to the large cloud width it is possible for every unit in the downwind hazard area to be forced to mask for several hours. Degradation occurs through prolonged wearing of IPE.

3.2.2.5.2.3. Low casualty risk . Occurs at wind speeds of 10 km/h or greater at stability categories of neutral to very unstable. The casualty risk is very low outside the area of immediate effects. Although a significant number of units will be forced to mask, agent duration will be short and will not extend as far as in previous category.

3.2.2.6. Implement Sanitation and Hygiene Measures. All personnel should practice proper hygiene and sanitation methods at all times. These measures should include hand washing with soap and water before eating and after using the latrine; protecting and properly storing food; consuming food and water from medically approved sources only; cleaning food preparation equipment and eating utensils after use; eating protected foods and drinking sufficient amounts of protected or treated water; using approved methods for collection, storage and disposal of sewage and other wastes; avoiding direct contact with blood, body fluids, and feces; using insect repellents, and wearing shoes or boots and clothing that protects arms and legs.

3.2.2.7. Cover Unprotected Mission Essential Equipment. Unit Commanders should direct personnel to cover mission essential equipment to prevent deposition of contamination on the equipment. This will reduce the need for decontamination and minimize the possibility of personnel contaminating themselves if they have to handle the equipment at a later time.

3.2.2.8. Suspend non-critical activities. The Commander should initiate sheltering of all non-mission essential personnel in designated shelters, available collective protection systems, or inner rooms of buildings (improvised shelters) which offer the best available degree of protection from contamination. When the possibility of attack is imminent personnel should remain in these areas when not performing mission essential tasks.

3.2.3. Trans-Attack Actions. Detection and warning of the attack are critical to the implementation of protective measures. The attack warning signal, Alarm Red, directs personnel to take cover and use protective measures. The following actions should occur immediately before and continue during attacks against the installation

3.2.3.1. Monitor NBC Warning and Reporting System for Reports of CB Attacks. The NBC control center should have direct communications within this system.

3.2.3.2. Monitor Intel/Airborne Radar Data. All personnel should be alert for signs of attack. Personnel specifically monitoring air and land approaches to the base, such as active air defense units, security forces, and air traffic control personnel should be particularly alert for indications of attack. Consider covert CB operations by SOF or sub-national groups in the evaluation process.

3.2.3.3. Issue Base-wide Warning. Issue base wide warning immediately upon notification of an attack. All but the most mission essential functions cease. Unless otherwise directed, all personnel should take cover and assume MOPP 4. Taking cover protects personnel against blast, shrapnel, heat, and liquid and particulate contamination. After taking cover, personnel don their masks and remaining protective gear as appropriate. All personnel should assume MOPP 4 in the absence of any other information, and remain in IPE until directed to reduce the MOPP level. Commanders should consider directing MOPP 4 until they can gain more information on the type and extent of contamination. MOPP levels may then be reduced accordingly. The ultimate goal is to balance mission continuation with force survivability in order to maximize mission effectiveness. Towards this end, the concept of risk assessment (what risk a Commander is willing to take in relation to the importance of the mission) is an integral part of the equation.

3.2.3.4. Monitor CB Attack Indicators. Personnel able to safely observe the attack in progress should watch for any unique signs of a CB attack. The three most obvious indications of attacks that contain CB weapons are positive CB detector alarms or positive indications on M8 paper/M9 tape, reports of casualties with CB symptoms, and reports of environmental data such as dead wildlife.

3.2.4. Post-Attack Actions . The following actions should occur immediately after attacks have been conducted against the installation.

3.2.4.1. Confirm CB Attacks. Designated personnel and specialized teams (i.e., security, shelter, reconnaissance, unexploded ordnance, and damage assessment) provide reconnaissance and assessment information for all types of damage and hazards. During initial reconnaissance, all critical personnel should be observant for operating or spent CB delivery systems or devices, such as spray tanks, aerosol generators, and submunitions or bomblets. Reconnaissance teams will check all suspected CB attack indications and verify use of CB weapons with available detection methods. For post attack operations, a capability is needed to survey areas, facilities, and personnel to determine the extent or absence of contamination on the installation. If the commander, particularly during joint operations, does not have operational control of detection assets, he/she should determine where these assets are and/or what is inside the detection “umbrella” or if these assets can be repositioned to cover the commander’s operations.

3.2.4.2. Implement Appropriate MOPP. Commanders will issue MOPP instructions based on best available information. Confirmed presence of CB weapons will require further investigation into type of agent and the potential duration of the hazard based on current and forecasted weather conditions. MOPP analysis, based on the local tactical situation, allows the commander to balance between reducing the risk of casualties and accomplishing the mission. Risk is involved, but the better the analysis, the lower the risk and higher the performance. They can also be used for estimating personnel requirements for operations in a CB environment. AFMAN 32-4005 provides MOPP analysis for each MOPP level.

3.2.4.3. Issue Reports. If a base obtains positive indications of a CB attack and it is the first verified use of CB warfare in theater, the Commander will immediately transmit an NBC 1 report, IAW ATP 45, by flash precedence up the reporting chain. Confirmation should be substantiated with all available information as quickly as possible. Higher headquarters will be seeking verification of the first use of CB agents to notify the National Command Authority. The NBC control center will issue additional NBC reports for subsequent attacks and more detailed information. The unit should obtain samples of suspected CB contamination for transfer to established laboratories for analysis and confirmation.

3.2.4.4. Implement Contamination Avoidance Procedures. Shelter teams should employ contamination control measures to limit the infiltration of contamination. They should continue to do so until it has been determined there is no longer a contamination hazard. All personnel should minimize contact with potentially contaminated surfaces until there are indications that surface contamination is no longer a hazard.

3.2.4.5. Implement Casualty Care. Medical personnel provide treatment for CB casualties according to established medical protocols. Such treatment includes supportive measures, isolation procedures, and antibiotic, antiviral, or antitoxin therapy.

3.2.4.6. Survey for Extent of Damage and Contamination and Evaluate CB Impact on Mission Sustainment. Civil Engineer damage assessment teams will survey the installation for damage based on reports from unit control centers. If persistent CB agent has been confirmed and the hazard is of sufficient duration, considerations must be made for providing rest and relief of personnel. Work rate, physical fitness, mental toughness, and weather condition are some determining factors.

3.2.4.7. Establish Decontamination Priorities. When decontamination of mission essential equipment is necessary, efforts should be consistent with available resources and the contamination's effect on critical mission operations. Limit decontamination operations to those actions necessary to minimize contact hazards and to limit the spread of contamination to both personnel and equipment. Commanders must be cognizant of residual contamination hazards and must protect personnel from possible chemical exposure.

3.2.4.8. Evaluate and Adjust Protective Measures. As CB hazards dissipate, MOPP can be adjusted accordingly. Variations to MOPP allow for combinations that reduce thermal burden yet still provide appropriate protections.

Chapter 4

THE CB VULNERABILITY ASSESSMENT TOOL

4.1. Introduction. There are a number of limitations associated with CB defense measures including limitations in equipment capabilities, and mission operations imposed by the use of CB defense equipment and measures. In some cases, it might seem as though the use of CB defense measures could cause as many problems as CB contamination itself. However, the significantly higher casualty rates and impacts on sortie generations likely in the absence of CB defense measures, undoubtedly would have far greater negative impact than the measures themselves.

4.1.1. A vulnerability assessment tool (VAT) has been developed to help commanders determine the best mix of defensive capabilities and strategies to employ against a predetermined CB threat. The VAT will help predict likely sortie and casualty levels in a variety of scenarios and assist in developing plans to limit mission degradation. The VAT scenarios include a large range of likely attacks and provide relevant defensive counter measures that can be initiated to minimize mission disruption and casualties.

4.1.2. The VAT is part of AFMAN 32-4017, Civil Engineer Readiness Technician' Manual for NBC Defense. The CE Readiness Officer will make initial assessments. Updates will be accomplished as situations and capabilities change. The following paragraphs provide a description of the VAT and include a sample assessment and analysis that has been accomplished using the tool.

4.2. Overview of the VAT Analysis . The operability estimates given in the VAT are based on a detailed simulation and analysis of air base operations in a CB environment, addressing two theaters of operation (Northeast Asia and Southwest Asia), two types of air base ("large" and "small"), and two times of year (summer and winter). The measures of effectiveness are the number of sorties generated (as a percentage of the tasking) and the number of CB-induced casualties (as a percentage of the base population). In order to make credible predictions, the analysis had to account for a host of relevant variables. These variables can be divided into three main categories: the representation of air base operations, the representation of the CB environment, and the representation of the CB defensive capability.

4.3. Representation of Air Base Operations. Details of the simulation of air base operations are in **Table 4.1.**

Table 4.1. Parameters Governing Simulation of Sortie Generation.

	Small Base	Large Base	
Aircraft	72 F-16	96 F-16	
Missions	Interdiction, Close Air Support		
Combat loads	Mark 82/84, CBUs		
Flight Size	4		
Sortie length	90 min		
Flying day (hrs)	NE Asia	SW Asia	NE
	Asia SW Asia		
Summer	15	14	15

Winter	10	11	10	
Tasking See Note 1				
Summer	3.3	3.1	3.7	3.5
Winter	2.7	3.1	3.0	3.4
Attrition Rate See Note 2				
Loss	0.5%			
Damage	1.0%			
Base Population	4,179		10,047	

Notes:

1. Sorties per aircraft per day.
2. Per sortie. Aircraft are housed in semi-hardened shelters. Assume no replacement during scenario.

4.4. Representation of the CB Environment. Several multi-day scenarios have been defined to represent the range of CB attacks most likely to occur on US air bases in each of the two theaters; they include chemical only, biological only, and combined chem/bio attacks. The combinations of delivery systems, agent types and quantities, attack times, target aimpoints, and meteorological conditions are represented by challenge-prediction models and define the CB environment.

4.4.1. NE Asia scenarios (5 days). There are eight scenarios as depicted in**Table 4.2.**.

Table 4.2. VAT Scenarios.

Chemical Only (Tactical Ballistic Missiles -TBMs- Only)	Biological Only (Covert Only)
Chemical Only (TBMs+Aircraft on Day 1)	Biological Only (Covert+TBM)
Four Chem+Bio scenarios with all possible combinations of the Chemical Only and Biological Only scenarios.	
Note 1. The three scenarios, which include aircraft, apply only to the large base case; it is assumed that the small base will not have penetrating enemy aircraft.	

4.4.1.1. Three TBMs filled with nerve agent are delivered at dawn on each day in all but the two Biological Only scenarios (a single conventional TBM is also included). Three of the 15 total chemical-filled TBMs contain a highly persistent and toxic nerve agent, 10 contain a medium-persistent nerve agent and two a low-persistent nerve agent. Blister agent-filled bombs are used in the aircraft attacks, along with conventional bombs. A usually non-lethal but potent and fast-acting toxin is used as the biological agent, delivered just past midnight on Day 1 (so as to take effect just before dawn) by backpack sprayers in the case of the covert attacks, and delivered at the same time on Day 3 by a TBM containing a large number of bomblets.

4.4.2. SW Asia scenarios (7 days). There are five scenarios, corresponding to the five NE Asia scenarios with no aircraft attacks. There are several differences in the scenario details, however. Five TBMs are used in the chemical attacks instead of three, but the highly persistent and toxic nerve agent is not used. Three of the five chemical-filled TBMs delivered each day contain a medium-persistent nerve agent and two contain a blister agent. The final difference is that a significantly more potent but slower-acting infectious agent is used as the biological agent and is moved up to Day 1.

4.4.3. Detailed meteorological data for Northeast Asia and Southwest Asia were used in defining the CB agent challenge histories and the heat stress conditions for the summer scenarios.

4.5. Representation of the CB Defensive Capability. All major areas of CB defense were considered for representation in the analysis leading to the VAT: individual protection, collective protection, detection and warning, contamination control, medical intervention, and training. The defensive components and cases ultimately selected for the VAT are shown in **Table 4.3.** and are briefly explained below.

Table 4.3. CB Defensive Components.

Component	Cases
Collective protection (“ColPro”)	Available (Y) Not Available (N)
IPE Type	BDO (B) JSLIST(J)
Cooling	Available (Y) Not available (N)
Dewarning	10 combinations of 3 postures and 3 decision points
Contamination Control (“DECONTAMINATION”)	Performed (Y) Not performed (N)

4.5.1. Collective Protection (ColPro). Collective protection provides a toxic-free environment that allows personnel to obtain rest and relief (long-term or short-term) or perform special functions (command and control, medical treatment) without the encumbrance of IPE. Only the long-term rest and relief role is represented in the VAT analysis.

4.5.1.1. In the cases where IPE must be worn around-the-clock, the simulation includes two 30-minute periods of short-term rest and relief each day in order to extend tolerance of the IPE to the full duration of the scenario. This has the effect of increasing casualties, since these breaks will not always occur in clean areas. In actual practice, attempting to find the least contaminated areas to use would mitigate the consequences of the breaks in protection. In the VAT analysis and simulation, however, it was necessary to assume that the breaks occurred wherever personnel happened to be located, although they were scheduled at the times of day with the lowest hazard. Two additional effects are some reduction of mask fit factors during sleep and degradation in next-day performance due to mask-induced sleep disruption.

4.5.2. IPE Type (summer only). IPE affords excellent protection from chem/bio hazards in most cases but impedes duty performance by interfering with communication, mobility, manual dexterity, and tactile sensitivity. Wearing the IPE in warm or hot weather also poses the risks of heat stroke and dehydration, requiring the use of work-rest cycles and/or auxiliary cooling. Also, water consumption must be enforced.

4.5.3. Personnel Cooling (summer only). Auxiliary personnel cooling is represented by simulating use of the Multi-Man Intermittent Cooling System (MICS). Whatever their protective posture, personnel can attach to a nearby MICS unit to receive cool, filtered air to the torso and face during the rest period of a work-rest cycle, hastening their return to work. This is modeled by shortening the rest periods in the "cooling available" cases to the rest times that would be required at an ambient temperature of 60×F instead of the (warmer) ambient temperature.

4.5.4. Dewarning Strategy. Determining when and where to allow personnel to reduce their individual protection is one of the more difficult decisions associated with operating in a CB environment. Dewarning levels are designated time intervals associated with established MOPP levels. For example, Dewarn 9 is Full IPE (MOPP 4) for 8 hours, then Mask Only. Dewarning too early may result in additional casualties, while erring on the conservative side by waiting too long after the hazard has dissipated can needlessly reduce sortie generation due to the effects of the IPE. The decision process is a complicated one that involves factors such as detector placement strategy, detector responses, meteorological conditions and predictions, and personnel locations. The commander's leadership style and risk tolerance also comes into play. Dewarning strategies do not apply to covert BW attack, for which personnel are considered unprotected at all times. Depending on the agent used and weather conditions, hazardous levels of CB contamination can persist on an air base for periods of time after an attack ranging from less than an hour to several days. Because of these effects, it is critical to the optimum operation of the air base that personnel not remain in their protective gear after all agent has dissipated and a hazard no longer exists.

4.5.5. Contamination Control ("Decontamination"). Contamination control includes both contamination avoidance (either pre- or post-attack) and decontamination (physical removal or chemical destruction). It is assumed that pre-attack contamination avoidance actions will be taken to cover or shelter equipment, but that decontamination will be limited due to time and resource constraints, the effectiveness of the IPE, and natural reduction of the hazard due to evaporation and absorption of the agent by the surface.

4.5.5.1. The decontamination strategy implemented in the simulation is to expediently decontaminate only the equipment which was directly exposed to the attack and only in those areas which may contact personnel. If decontamination is not performed, personnel may pick up residual CW agent which can result in additional casualties. If decontamination is performed, pickup is eliminated for all but security forces and personnel performing chemical reconnaissance. Decontamination does not benefit these functions because by the nature of their duties they are susceptible to pickup from large areas of contaminated ground and other outdoor surfaces and could not feasibly decontaminate these prior to going about their duties.

4.6. Major Assumptions and Limitations. The VAT is subject to the following major assumptions and limitations:

4.6.1. Aircrew casualties do not affect sortie levels. The simulation methodology does not allow aircrew members to be tracked as separate resources required for the launch of sorties. Casualties among aircrew members are reflected in the casualty totals but do not affect the predicted sortie levels.

4.6.2. Personnel are warned and fully protected before the first CB agent arrives in all but the covert BW attack, which is not detected. It is assumed that a heightened state of readiness precedes all attacks, enemy aircraft and TBMs will be detected shortly after launch, and all attacks are initially considered CB.

4.6.3. All aircraft are ready on the morning of Day 1 of the scenario and can be launched despite massive casualties from the covert BW attack. It is assumed that all aircraft will be fully armed, fueled and otherwise mission-ready in light of the heightened state of readiness, that enough aircrews will be available, and that enough ground crew members will be available to perform the final tasks prior to taxi and takeoff.

4.6.4. Personnel must remain in IPE around-the-clock if collective protection is not available. It is assumed that logistics and security problems would preclude relocation to an uncontaminated off-base site for relief from the IPE. The remaining option, open-air rest and relief, depends on detection and hazard prediction capabilities for identifying TFAs on-base. The feasibility of this option depends on the state of these capabilities as well as the extent of contamination of the air base; its representation was not in the scope of this model.

4.6.5. Sufficient overhead cover and contamination avoidance covering is available to protect the vast majority of air base equipment from falling droplets/aerosols from the CB attacks. The underlying assumption is that the base is a main operating base and that deploying forces have not yet arrived. If these assumptions are not valid, the reported sortie levels may be too high in the “Decon Performed” cases, since the time requirement to decontaminate exposed equipment will have been underestimated. Similarly, the reported casualty levels would be too low in the “Decon Not Performed” cases, since more equipment would be contaminated and the risk of agent pickup would be higher if less equipment was covered at the time of the attack.

4.6.6. Mechanical disturbances of BW agent particles deposited on ground, equipment, and personnel surfaces following an attack do not result in hazardous levels of reaerosolized agent. The capability to credibly model this reaerosolization phenomenon does not currently exist.

4.7. Using the Vulnerability Assessment Tool. There are two closely related purposes for using the VAT. The first is to determine whether effective air base operations are possible in a given situation that approximates one of the combinations of operating location, base type, time of year, and defensive capability represented in the tables. The second is to identify changes to CB defensive capabilities and strategies that will facilitate continued effective air base operations. The complete VAT consists of a total of eight tables, one for each combination of operating location, base type, and time of year.

4.7.1. The air base operability/survivability prediction for a given combination of attack scenario and defensive capability is found in the intersection of the column for that attack scenario and the row for that defensive capability. The attack scenario columns are divided into two sub-columns, headed “S” and “C.” The “S” sub-column displays the predicted sortie generation for the entire scenario as a percentage of the air tasking. The sub-column labeled “C” contains the predicted CB-induced casualty total for the entire scenario as a percentage of the air base wartime population (casualties reflect those personnel who do not return to duty before the end of the scenario).

4.8. Operability Predictions: Important Considerations.

4.8.1. *Variability.* Since many of the variables affecting CB air base operations are random in nature, the results of the simulation often fluctuate greatly from one trial or replication to the next. The single result shown in each cell of the VAT tables is actually a median or middle value out of 40 trials; the sortie or casualty levels realized in actual operations could be substantially higher or lower.

4.8.2. *Maximum Achievable Sortie Level*. The sortie levels reported in the tables are percentages of the air tasking. Due to the attrition of some aircraft and the assumption that no aircraft can be replaced during the scenario, the highest sortie level which can be obtained in the simulation, even with no attacks and no IPE wear, is only 90%. The sortie rates given in the tables would consequently be higher if replacement of aircraft were allowed.

4.8.3. *Casualty Timing and Duration.* The casualty levels shown in the tables represent the percentage of the wartime base population that is removed from action for the duration of the simulation scenario. The timing of the casualties is not reflected in the casualty results but would be reflected in the sortie level for that case. For example, since personnel are not replaced, casualties on Day 1 would reduce the sortie level more than casualties on Day 5.

4.8.4. *Effect of Limited Cover for Equipment*. If it is anticipated that cover for equipment will be limited, a greater loss of sorties may be expected in the "Decon Performed" cases due to a longer time requirement for decontamination. At the same time, a greater number of additional casualties should be anticipated in the "Decon Not Performed" cases (again due to a greater number of exposed equipment items).

4.9. Sample VAT Scenario. Table 4.4. provides a sample extract from the complete VAT. It is intended only as an introduction to the use of the VAT and to provide a few general insights into the most important considerations affecting operability in the CB environment. Note: Specific operability estimates pertaining to a particular situation of interest should be located within the complete VAT.

Table 4.4. Sample VAT Data: CW-Only / TBM-Only Scenario.

Theater/ Base Type	Time of Year	Defensive Capability	Baseline[1]			With ColPro			With Cooling[2]			With Decon		
		S = Sorties	Dewarn Case[3]			Dewarn Case			Dewarn Case			Dewarn Case		
		C = Casual-ties	9	6	3	9	6	3	9	6	3	9	6	3
NE Asia	Summer	S %	42	58	71	42	62	76	63	69	73	-	58	72
Large Base		C %	2	4	5	0	2	3	2	4	5	-	2	2
NE Asia	Winter	S %	70	72	75	75	78	81	-	-	-	68	72	75
Large Base		C %	14	18	20	0	3	4	-	-	-	13	13	13
SW Asia[4]	Summer	S %	17	35	47	19	38	55	45	57	65	-	34	46
Large Base		C %	6	8	10	0	0	0	6	8	10	-	8	10
SW Asia	Winter	S %	64	66	70	70	72	75	-	-	-	64	67	70

Large Base		C %	2	5	7	0	0	0	-	-	-	2	5	7
		Defensive Cases												

Notes:

1. Baseline Case: IPE Type is BDO; collective protection and cooling are not available and decon is not performed. Sorties increase by approximately 5 to 15% in summer cases when the JSLIST is used instead of the BDO (the benefit is proportional to the time spent in the full IPE; casualties are not affected).

2. Cooling is not an operational consideration during the winter.

3. Dewarn 9: Full IPE throughout; Dewarn 6: Full IPE for 8 hours, then Mask Only; Dewarn 3: Full IPE for 1 hour, then Mask Only.

4. Location differences: Casualties are higher in NE Asia, especially for the mask-only de-warn cases, due to greater agent persistence and toxicity. Sorties are lower in SW Asia in summer due to higher temperatures.

4.10. VAT Examples.

4.10.1. Effect of Dewarning. The benefit of de-warning can clearly be seen by comparing baseline defensive/de-warn case 9 to baseline defensive/de-warn case 3. Notice that for both theaters, adopting a mask-only posture one hour after the attack increases sorties by about 30% in summer and 5% in winter. Casualties also increase, 3-4% in summer and 5-6% in winter. Going to a mask-only posture after eight hours instead of one hour increases sorties to a lesser degree (about 17% in summer and 2% in winter) but also reduces the additional casualties, to 2% in summer and 3-4% in winter.

4.10.1.1. In the “With ColPro” and “With Decon” defensive capability cases, the added casualty risk from de-warning to a mask-only posture is lower than that for the baseline case, with slightly higher gains in sorties. On the other hand, if cooling is already available to alleviate heat stress, fewer sorties will be gained by reducing protection.

4.10.1.2. Further de-warning by removing the mask would not be feasible on a base-wide scale in many cases, with the exception of the bio-only attacks. Unless the TBMs are sufficiently off-target (as does happen in some of the simulation trials) the repeated daily CW attacks are enough to cause a vapor hazard to persist over much of the base for most of the scenario.

4.10.2. Effect of Collective Protection. Adding collective protection reduces casualties substantially, to 2-4% in the NE Asia early de-warn cases (6 and 3) and to near zero in all other cases. Sorties increase in most cases by 4-6%. The benefits of adding collective protection are even greater in the other attack scenarios.

4.10.3. Effect of Personal Cooling. Compare defensive cases 1 and 7 (bottom row of table) for NE Asia, large base, summer. In both cases personnel are in full IPE around-the-clock (dewarn 9), but in case 7 cooling is added. Sorties are increased approximately 20% due to the reduction in the rest time of the work-rest cycles, without affecting casualty rates. The sortie gains due to cooling are reduced when heat stress is already partially alleviated by de-warning (or by wear of the JSLIST vs. the BDO). Although January daytime temperatures are mild in SW Asia, cooling is not an operational consideration in the winter for either theater of operation.

4.10.4. Effect of Decon. Compare the casualties for NE Asia/large base/winter defensive case 3 (20%) to that for defensive case 12 (13%). Reduction of the liquid hazard by decontamination lowers casualties when protection is reduced to mask-only in the presence of a sufficiently-persistent and toxic agent.

4.11. General Conclusions. Although results vary considerably across operating situations, CB attack scenarios and defensive capabilities, a few general conclusions can be stated. The detailed VAT should be consulted for specific operability estimates pertaining to your particular situation of interest.

4.11.1. Heat stress will significantly degrade operability in both theaters in summer; some type of heat stress relief will be required in order to sustain operations, especially in SW Asia. Personnel cooling and/or early de-warning to the mask-only (or mask-and-gloves-only) protective posture represent the most effective means of increasing sortie output. Use of the JSLIST suit instead of the BDO will help but to a lesser degree; most of the thermal burden is associated with wearing the suit.

4.11.2. Most of the CB hazard is of the vapor/aerosol variety; there is very little contact hazard except when a highly persistent and toxic nerve agent is used. If it can be determined that an agent of this type has not been used, the mask-only posture can be adopted shortly after the attack with very little additional risk of casualties. If it cannot be confirmed that such an agent has not been used, de-warning to mask and gloves (MOPP Alpha) only would represent the same heat stress relief while protecting against most of the contact hazard; this hazard can be further reduced by expedient decontamination of exposed equipment.

4.11.3. Decontamination is of little value except when a highly toxic and persistent nerve agent has been used and it is desired to reduce MOPP level to a mask-only or mask-and-gloves-only posture. In such cases the most effective strategy would be to identify equipment which has been directly exposed to the attack (left outdoors uncovered) and then expediently decontaminate only that equipment, focusing on those areas which are most likely to directly contact personnel. The risk of secondary transfers (ground to equipment to person, or equipment to equipment to person) is negligible.

4.11.4. Even in the absence of heat stress (winter scenarios), use of the individual protective equipment degrades performance, although to a much lesser degree. Almost all of the non-thermal degradation in performance is due to the mask and gloves. Unless a highly persistent and toxic nerve agent has been used, it will be possible to remove the gloves with negligible additional risk. If such an agent has been used, focused and expedient (spot) decontamination measures can eliminate most of this risk and allow glove removal where necessary. With attacks repeated each day, it will not be possible to remove the mask for long periods of time on much of the air base without incurring significant risk.

4.11.5. In the absence of ColPro it will be imperative to establish sites either on-base or off-base to which personnel can be relocated for removal of IPE and long-term rest and relief. Around-the-clock operations in IPE will not be possible in a multi-day scenario. If factors such as logistics and security difficulties preclude the off-base option, it should be kept in mind that clean areas on base will become harder to find as the scenario progresses (assuming attacks repeated each day), and in some cases (depending on the scenario) they may not exist at all.

4.11.6. Scenarios with biological attacks result in significant numbers of casualties with the SW Asia threat agent, even with full protection available. Casualties are lower in the chem+bio scenarios than in the equivalent biological-only scenarios because the repeated chemical attacks on days following the biological attack force personnel to remain in protective gear. De-warning after a maximum of 24 hours is assumed in the biological-only attacks, resulting in casualties due to residual aerosol levels inside of unfiltered facilities.

A vapor/aerosol hazard will persist longer in indoor facilities without collective protection than it will outdoors, particularly in the case of biological attacks. This can be lessened by shutting down ventilation systems which draw air in from the outside during and for one hour after the attack.

Chapter 5

CB RISK AND MITIGATION

5.1. General. Knowing the risks and vulnerabilities in a CB environment allows the commander to determine their unit's situation and provides options to mitigate those vulnerabilities. The Air Force uses operational risk management (ORM) as a logic-based, common sense approach to making calculated decisions on human, materiel, and environmental factors before, during, and after Air Force mission activities and operations. The ORM six-step process includes:

5.1.1. Identify the Hazards . Hazards are any real or potential condition that can cause mission degradation, injury, illness, or death to personnel, or damage to or loss of equipment or property.

5.1.2. Assess the Risk . Risk is the probability and severity of loss from exposure to the hazard.

5.1.3. Analyze Risk Control Measures . Effective control measures reduce one of the three components (probability, severity, or exposure) of risk.

5.1.4. Make Control Decisions . Decision-makers at the appropriate level choose controls based on analysis of overall costs and benefits.

5.1.5. Implement Risk Controls. Implementation requires commitment of time and resources.

5.1.6. Supervise and Review . ORM is a process that continues throughout the life cycle of the system, mission, or activity.

5.2. CB Operational Risk Management. **Figure 5.1.** and**Figure 5.2.** on the following pages illustrate a chemical and biological risk assessment and efforts to mitigate the risks. Particularly in high threat (high-risk) areas, the commander must focus on the efforts that they have direct control over (i.e. MOPP levels, decontamination, hygiene, etc.) first as outlined in**Chapter 2**.

Figure 5.1. CW Risk Assessment Flowchart.

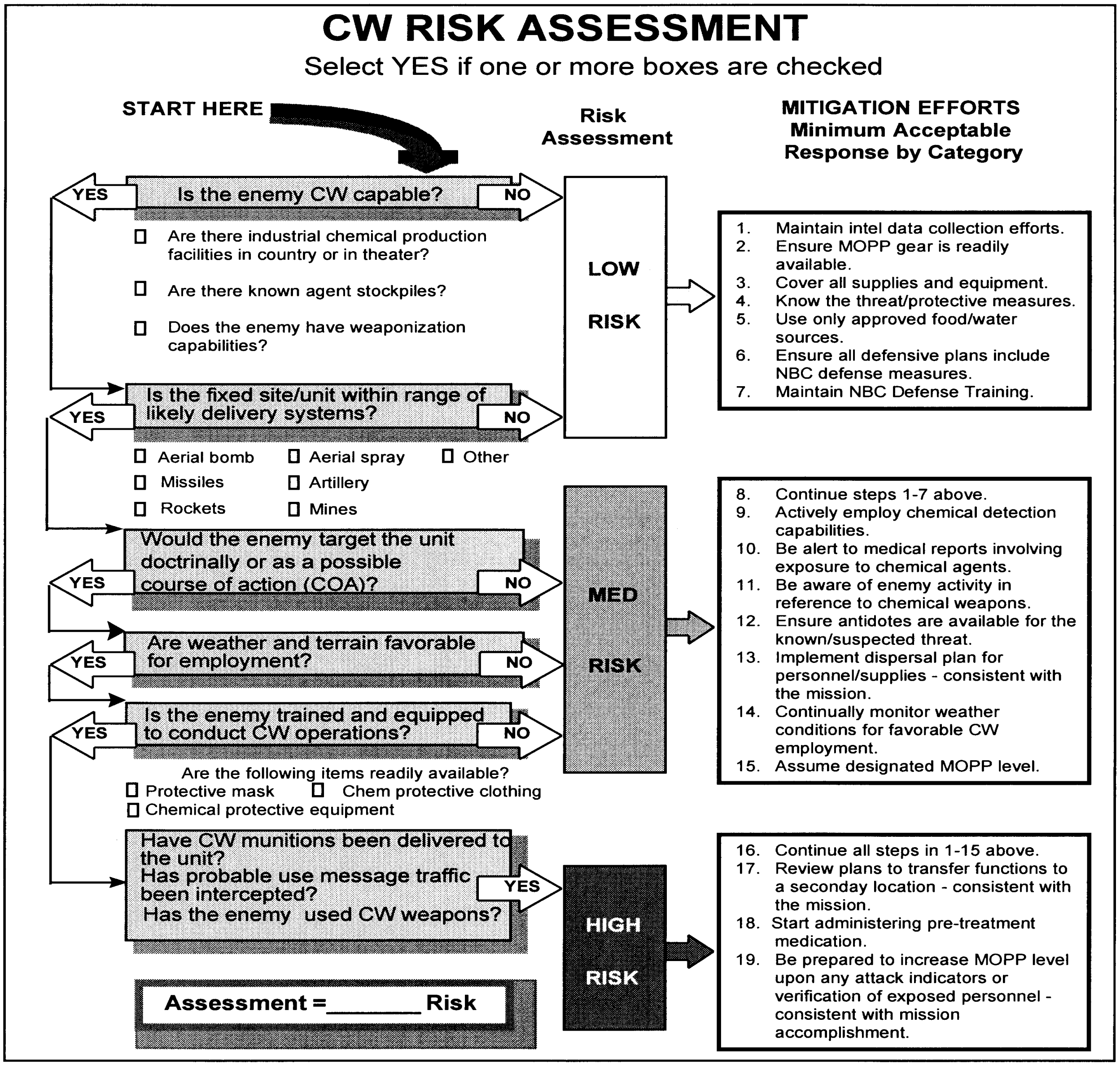
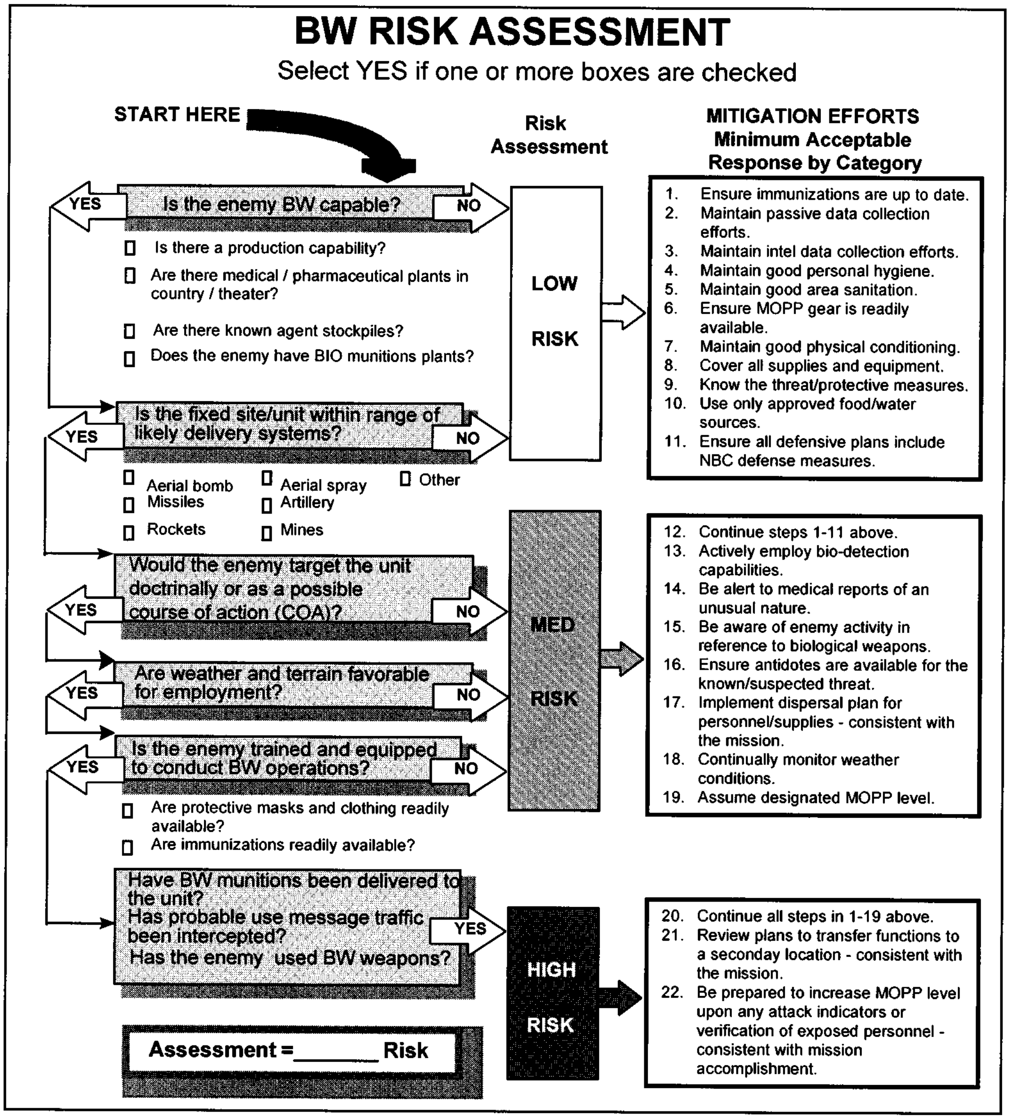


Figure 5.2. BW Risk Assessment Flowchart.



5.3. Summary. The proliferation of chemical or biological weapons and their delivery means is not a hypothetical threat. More than 25 countries have - or may be developing - WMD weapons and the means to deliver them; a larger number are capable of producing such weapons, potentially on short notice. In addition, the CB proliferation threat has become transnational and now has the potential to come from terrorist organizations or organized crime groups. Proliferation of CB weapons, and their means of delivery, presents a daunting challenge. The United States will need perseverance, patience, and imagination to combat this threat.

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Attachment 1

GLOSSARY OF ABBREVIATIONS, ACRONYMS, AND OTHER SUPPORTING INFORMATION

Abbreviations and Acronyms

AFSC—Air Force Specialty Code

ATP—Allied Tactical Publication

BDO—Battle Dress Overgarment

BW—Biological Warfare

CB—Chemical, Biological

CCA—Contamination Control Areas

CINC—Commander-In-Chief

CMBCC—Consolidated Mobility Bag Control Center

COA—Course of Action

ColPro—Collective Protection

CW—Chemical Warfare

CWC—Chemical Weapons Convention

DIA—Defense Intelligence Agency

DoD—Department of Defense

IPE—Individual Protective Equipment

JSLIST—Joint Service Lightweight Integrated Suite Technology

MICS—Multi-Man Intermittent Cooling System

MOPP—Mission Oriented Protective Posture

NBC—Nuclear, Biological, Chemical

NBCWRS—Nuclear, Biological and Chemical Warning and Reporting System

NCA—National Command Authority

ODS—Operation Desert Storm

ORM—Operational Risk Management

PACAF—Pacific Air Force

QDR—Quadrennial Defense Review

SCPE—Simplified Collective Protection Equipment

SCPS—Survivable Collective Protection Systems

TBM—Tactical Ballistic Missile

TEMPER—Tent, Expandable Modular Personnel (tents)

TFA—Toxic Free Area

UNSCOM—United Nations Special Commission

UTC—Unit Type Code

UXO—Unexploded Ordnance

VAT—Vulnerability Assessment Tool

WMD—Weapons of mass destruction

WRM—War Reserve Material

Terms

Antibiotic—A substance, as penicillin, that is produced by organisms such as fungi and bacteria, effective in the suppression or destruction of microorganisms, and widely used in the prevention and treatment of diseases.

Antidote—A remedy that counteracts the effects of a poison.

Antigen—a substance that when introduced into the body stimulates the production of an antibody.

Antisera—human or animalserums having antibodies for at least one antigen.

Biotechnology—The engineering and biological study of relationships between human beings and machines.

Chemoprophylaxis—Use of chemicals in the prevention of infectious diseases.

Collective protection (ColPro)—systems protect those inside a building, room, shelter or tent against contamination through the combination of impermeable structural materials, air filtration equipment, air locks, and overpressurization.

Contamination Avoidance—actions to prevent contamination from getting on mission-essential resources and personnel, whether directly from agent deposition or by transfer from contaminated surfaces.

Contamination Control—procedures to avoid, reduce, remove, or render harmless, temporarily or permanently, nuclear, biological, and chemical contamination for the purpose of maintaining or enhancing the efficient conduct of military operations.

Dewarning Levels—designated time intervals associated with established MOPP levels and variations such as MOPP Alpha and “Mask Only” variation.

Immunoprophylaxis—prophylactic immunization is the only means of providing continuous protection against BW threats prior to, as well as during, hostile actions.

Medical countermeasures—fall into three basic categories: prophylactic (preventative), therapeutic (post-exposure), and diagnostic.

Principles Of CB Defense—avoidance, protection, and contamination control (defined as decontamination in Joint Pub 3-11).

- The contamination control principle includes a variety of contamination containment and avoidance activities as well as decontamination actions.

- The principle of avoidance includes the elements of detection, identification, prediction, warning, reporting, marking, and relocation or rerouting.

- The protection principle includes typical CB defense measures involving use of individual protective equipment, shelters, and specific medical countermeasures.

Proliferation—The process by which one nation after another comes into possession of, or into the right to determine the use of nuclear, biological, or chemical weapons, each potentially able to launch a NBC attack upon another nation.

Prophylactic Vaccinations—preventive inoculations with a vaccine so as to protect against a given disease.

Shelters—structures that protect personnel from exposure to CB contamination. As a minimum, they provide a physical barrier that keeps a portion of the contamination away from the people inside.

Toxic Free Areas—provide personnel the ability to work or obtain rest and relief without wearing IPE.